THE FLIGHT INSTRUCTOR SPIN TRAINING ENDORSEMENT

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16 Feb 2021

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RVAC AEROBATIC CONTEST
TROPHY PRESENTATIONS 2003

INTRODUCTION

RVAC has been prominent in the sport of aerobatics for many years:

- This perpetual trophy was first awarded in 1935. Read out a few of the names – anyone recognise them? EG Roberts 1935, PJ Gibbes 1936, JH Hood 1938, CH Cook 1939,**CA Morrison** 1962, Miss PJ Brown 1967, WF Waterton 1968, JC Fincher 1969, GA Seymour 1971, HV Markby 1975 and RJ Maclean 1977
- RVAC pilots competing at the 1974 National Championships were **Con Simari**, Harry Markby, John Day, John Boag, Dick Maclean, **Ken McKechnie** – that was half the field!
- In 1977, new boy **David Pilkington** had joined them (started aerobatics in 1969 and later some aeros with former RVAC CFI Roy Goon).

Flying Instructor of the Year

2019 Winner – David Pilkington

Mr David Pilkington *(Australie)*

en reconnaissance des remarquables services rendus à l'aéronautique et aux sports aériens, et plus particulièrement à la voltige aérienne.

For instance, David Pilkington gave a masterly exhibition in the stock standard and now very dated ACA Super Decathlon *Little Nell*, including a half upward vertical roll, an elegant slow motion avalanche, and a remarkable knife-edge half-Cuban which he repeated in case his audience, like me, couldn't believe it was possible.

A U S T R A L I A N A E R I A L
C L U B
NEWSLETTER AUGUST 1973.

MELBOURNE CHAPTER AERO CLUB COMPETITION

Attn: Mr. Malcolm White

Dear Mr. White,

On 29 and 30 September 95, Mr. Lester Berven, an FAA flight test pilot from the Sea ACO flight test branch reviewed your production flight test acceptance procedures for both the HUSKY A-1, and the Pitts S-2B. Mr. Berven also flew both aircraft, and completed a production flight test pilot standardization check for Messrs. Peter S. Pierpont and David J. Pilkington.

Based on the successful completion of the document review and the flight evaluation, Messrs. Pierpont and Pilkington are hereby authorized to conduct and approve produc acceptance flights for both the HUSKY A-1 and the Pitts S-1, and S-2 (all variations).

National Aerobatic Championships
Griffith NSW 1985

Advanced Category

FINAL PLACINGS

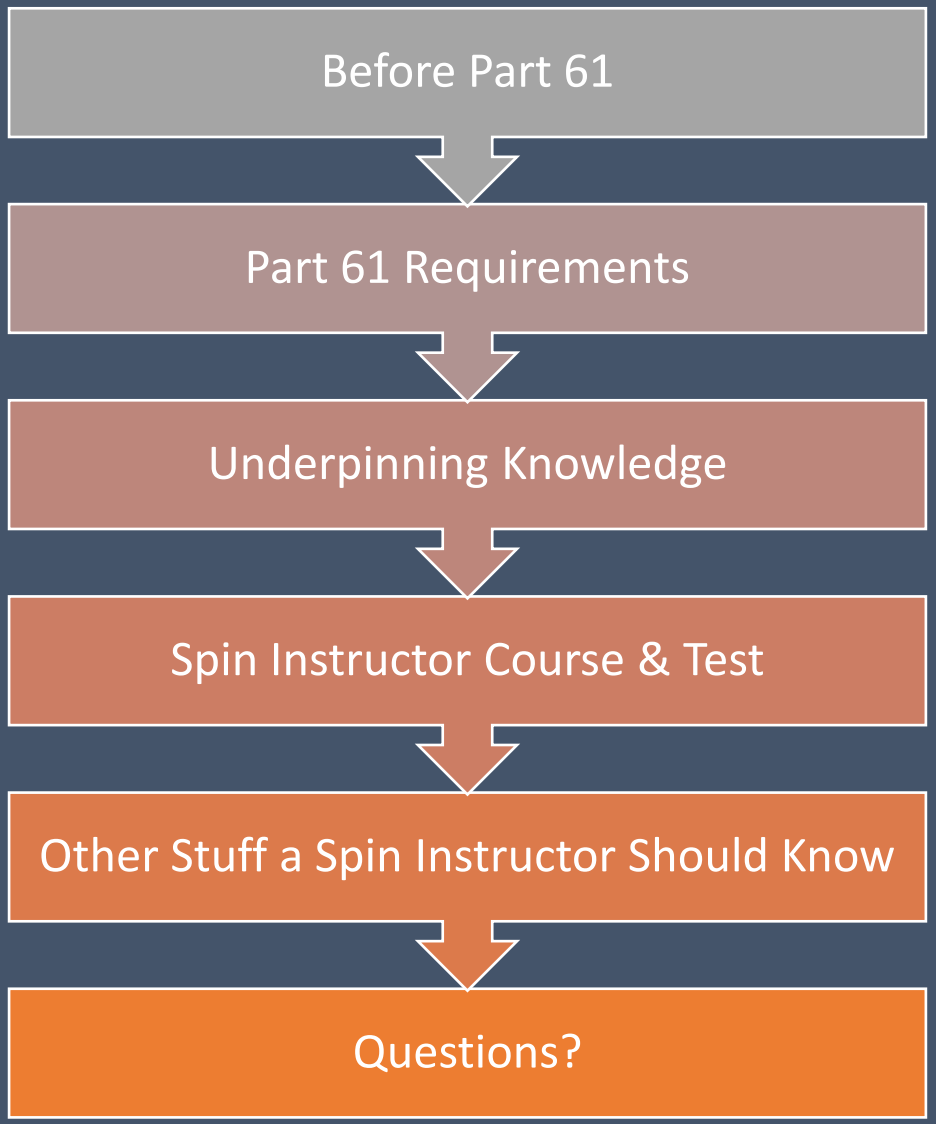
NAME	SCORE
D.Pilkington	6184.7
W.Farley	5750.1
J.Walker	4623.8
C.Burns	3052.8

FINAL PLACINGS 1986

UNLIMITED

NAME	SCORE
G.Selvey	13796.4
M.Beard	12869.2
B.Henderson	12820.1
P.Larsen	12354.5
S.Hart	10002.2
C.Sperou	9459.4
D.Pilkington	8845.4

CONTENT - OVERVIEW



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Before Part 61

an authorised flight instructor who gave the holder spinning training is satisfied that the holder can safely recover an aeroplane from a fully developed upright spin

The holder of an instructor rating may not give flight instruction in spins in aeroplanes other than those aeroplanes for which he or she has been certified as competent to give such instruction. Such certification may be made by a chief flying instructor or a Grade 1 flight instructor who has been certified as being competent to give such instruction.

FIM & eventually CAAP 155-1 in 2007

No standards and nil requirements for underpinning knowledge.
The CAAP introduced recommended standards.

- Spin defined (in the FIM but nowhere in the CAAP) as:

"a condition of stalled flight in which the aeroplane describes a spiral descent"

- CASA specific AFM to CASA template of limited scope until 2002 so
  - No recognition of original certification
  - Scant reference, if any, to the original AFM and the proven spin recovery method
  - Each flight school made up their own, different, handling notes

7.22 Standard Spin Recovery:

- Close throttle;
- Centralise ailerons;
- Identify if the aircraft is spinning, the direction, and whether upright or inverted;
- Full rudder opposite to rotation (opposite to yaw);
- Pause;
- Elevator forward f[illegible] upright and back for inverted as required to unstall;
- When rotation stops - centralise rudder;
- Roll wings level and recover to level flight.

7.23 Aircraft Type Differences

7.23.1 Spin recovery procedures will vary between aircraft types and situations. The aircraft flight manual should be the final authority for spin recovery procedure, but some issues that may need to be considered are:

- Too much or too rapid an application of elevator control may blanket the airflow over the rudder, making it ineffective;
- Too much or too rapid an application of elevator control may flick the aircraft from an upright to an inverted spin or vice-versa;
- Use of aileron into the spin may sometimes assist in recovery;
- Where there is difficulty differentiating between an upright and an inverted spin, full back control column may ensure the aircraft enters an upright spin.

BEFORE THE INTERNET

Engine power was then heard to decrease and the aircraft entered a spin, probably to the left although one of several witnesses believed it was to the right. As the spin progressed, the nose attitude appeared to steepen to the near vertical. After making four complete turns, and after the fifth turn commenced, the aircraft struck the ground some 600 metres south-east of the aerodrome terminal building. There was no fire.

WARNING

An operating procedure, practice or condition, etc. which may result in injury or fatality, if not carefully observed or followed.

WARNING

Do not allow aircraft to spin unless sufficient altitude exists for safe recovery.

- What info did the pilot have on spinning the Decathlon as there was diddly squat in the Australian AFM and the FAA approved AFM had been discarded per Australian law.
- In 1983 there was no general knowledge of aggravated spins eg accelerated.

YouTube Video – Chipmunk Spin Accident

https://youtu.be/0U57BbbZfm8

Bad Spin Training

Bad Spin Training

“Furthermore, the pilot was taught a spin recovery method that was not effective for recovering from such spins in the aircraft. ….. aircraft’s flight manual had not been approved by the Civil Aviation Safety Authority and did not include advice on spin recovery. The mandatory, Civil Aviation Safety Authority-approved flight manual contained spin recovery advice.

All of the pilot’s spin training was to the left. According to the pilot’s logbook, endorsements for wingovers, aileron rolls and spin recovery were approved on 7 July 2013, after 3.5 hours of aerobatic instruction.

Prior to their Chipmunk training, the pilot had conducted spin recovery training in a DH-82 Tiger Moth and an American Champion Citabria.

The pilot reported that his actions for spin recovery were normally to apply full opposite rudder and a small amount of opposite aileron, and to centralise the elevators. The method did not vary between any of the aircraft types flown by the pilot.”

Bad Spin Training

“The flying instructor who endorsed the pilot for spin recovery reported using and teaching the following method for spin recovery in the Chipmunk:

- throttle closed
- full opposite rudder
- neutral aileron
- move the elevators about two thirds of the way from full back towards the central stick position but not all the way.

The second instructor could not specifically recall teaching the pilot, but described a similar spin recovery method with the exception that the pilot should continue pushing the control stick forwards (elevators down) until the rotation ceases. The flying school’s chief flying instructor reported that forward stick should be applied during spin recovery.

A flight manual for the Chipmunk used by the pilot’s flying school was a reprint of a 1966 UK military flight manual and was not specifically approved for, or tailored to, the flying school’s Chipmunk. On spin recovery, it gave” correct information however – why didn’t the instructor follow it!

Chipmunk Spin Recovery

a) check throttle CLOSED;
b) check ailerons CENTRAL;
c) apply full OPPOSITE RUDDER;
d) PAUSE;
e) move the stick firmly FORWARD against the increasing stick force and stick buffet, IF NECESSARY TO THE FRONT STOP and hold it there until rotation ceases;
f) when rotation ceases CENTRALISE the rudder control and ease out of the ensuing dive

In Australia prior to 2002, CASA and its predecessors prepared, approved and issued AFMs for light civil aircraft. **The flight manual in use for UPD was one such manual, approved specifically for that aircraft by CASA's predecessor in 1988. It did not include guidance on spin recovery.**

CASA advised that operators of civil T Mk 10 aircraft were required to use the 2002 flight manual.

According to the aircraft type design organisation, the owner of UPD did not purchase the newer flight manual.

Instructor Responsibility & Liability

"The pilot and first instructor reported that during instruction and evaluation in the Chipmunk, spin recovery action would commence after about one or one and a half turns ….. They reported that the spin would cease after a further one or one and a half turns. The flying school's operations manual did not include instructions on the appropriate number of turns in a spin before recovery should be attempted, and the chief flying instructor advised that spin recovery would normally be initiated within about two turns."

- **So, just incipient spins and only to the left. The correct spin recovery procedure was not taught!**
- **The standard of training provided by this flight school and this instructor makes me angry.**

Blunt Instrument

Quite rightly, CASA has recognised that ***"old" instructors may not be current nor competent*** in the new Part 61 standards but has tackled that with a crude, blunt instrument: CASA 62/20 - Conditions on authorisations — flight crew licences and aircraft endorsements

Condition on an instructor rating

It is a condition on an instructor rating that the holder of an instructor rating with a training endorsement may only conduct training for a flight activity endorsement if:

(a) the holder has demonstrated competency in doing so to a person authorised to conduct a flight test for the relevant training endorsement; and

(b) the person authorised to conduct the flight test mentioned in paragraph (a) holds the flight activity endorsement.

Action per this instrument would not have saved those in that Chipmunk accident as the instructor would've demonstrated competency in the type the flight school generally used. Part 61 spin instructors are only required to know the spin behaviour of the type they were trained on.

Professional instructors would ensure they get up to speed on the new standards anyway.

Instructors must also make themselves familiar with the behaviour of different types – isn't that important?

Part 61 Spin Training Endorsement Requirements

Spinning training endorsement	Conduct flight training for a spinning flight activity endorsement	Private pilot licence, commercial pilot licence or air transport pilot licence Spinning flight activity endorsement

The applicant must also have:

(a) met the aeronautical experience requirements (if any) mentioned in column 3 of the item; and

(b) completed flight training for the endorsement; and

(c) passed the flight test mentioned in the Part 61 Manual of Standards for the endorsement; and

FAE-8 Spinning

1 Unit description

This unit describes the skills and knowledge required to execute and recover from an upright spin manoeuvre.

2 Elements and performance criteria

2.1 FAE-8.1 – Recover from spin

(a) perform pre-manoeuvre checks;

(b) enter and establish an upright spin;

(c) identify upright spin and direction of yaw;

(d) close throttle;

(e) stop yaw;

(f) unstall wing by reducing AOA;

(g) recover to controlled flight;

(h) recover within the number of turns normally required for upright spin recovery in the aircraft type, within the aircraft and height limitations.

Does this mean to get it to the fully developed phase or not (some types cannot achieve that)? Why use text rather than the words generally used to describe a spin?

This text can lead to confusion. Does it mean to stop the yaw and only then then unstall the wing? Instead, why not simply state to stop the spin using the method appropriate for that type?

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR flight in VMC;

(c) within the lateral and vertical limitations of the planned manoeuvring airspace using an approved aerobatic aeroplane.

DEFINITIONS

From the FAR 23 Flight Test Guide

A spin is a sustained autorotation at angles-of-attack above stall.

That is the definition of the spin applicable to the AFM!

1. § 23.221 Spinning.

a. Explanation.

(1) *Spin*. A spin is a sustained autorotation at angles-of-attack above stall. The rotary motions of the spin may have oscillations in pitch, roll, and yaw superimposed upon them. The fully developed spin is attained when the trajectory has become vertical and the spin characteristics are approximately repeatable from turn to turn. Some airplanes can autorotate for several turns, repeating the body motions at some interval, and never stabilize. Most airplanes will not attain a fully developed spin in one turn.

UNDERPINNING KNOWLEDGE

(a) actions required to recover from an incipient spin (wing drop at point of stall);

I note that CASA's FIM (Flight Instructor Manual) has separate and different recovery actions for recovery from a stall when the wing drops (pages 34 and 53) and recovery from an incipient spin (page 52). Refer the new AC 61-16 Spin avoidance and stall recovery training.

(b) what control inputs, with an aeroplane in any attitude, at the point of stall, are likely to cause a spin;

(c) blanketing effects the elevator can have on the rudder during spin recovery;

(d) significance of stick and control wheel position with respect to spin recovery;

It is important to know what to expect if different control actions are made eg an accelerated spin.

(e) aerodynamic causes of a spin;

(f) what aerodynamic factor determines the direction of a spin;

(g) how to recognise a stable spin;

(h) difference between a stable spin and an unstable spin;

(i) effects of C of G position on spin performance and acceleration;

(j) difference between a spin and spiral dive;

UNDERPINNING KNOWLEDGE

(k) factors which may lead to a flat spin;

The FIM page 53 hints at the effects of inspin and outspin aileron and that different types have different behavior. What about the types that you train in?

(l) difference between an upright and an inverted spin;

CAAP 155-1 assists here.

(m) visual indications used to determine the direction of a spin;

CAAP 155-1 assists here.

(n) instrument indications used confirm the direction of a spin;

It is very important to know what is in the AFM!

(o) standard spin entry and recovery techniques for the aircraft being flown;

(p) number of turns normally required for spin recovery in the aeroplane type;

(q) height normally required entering and recovering from a stable spin;

(r) Mueller-Beggs spin recovery action and limitations on its application;

CAAP 155-1 assists here.

(s) 'g' and any other limitations applicable to spinning for the aeroplane type.

Video – Proper & Improper Spin Recovery

https://youtu.be/vETMS-QI_8I

LESSON NUMBER	MOS REF	LESSON DESCRIPTION	GROUND HOURS	DUAL HOURS	TOTAL PROG FLIGHT TIME
		10.7 hrs total classroom time just for spins			
For Initial issue of Flight instructor Rating (if required)			24.0 hrs		
		FIRC - Principles and Methods of Instruction and Legislation	12.0		
		Short Theory Lessons (Aviation based - refer to course notes)	12.0		
Aeronautical Knowledge - Review			3.2 hrs total		
TE18-1	FIR-TE18.1; FIR7	Review - Part 61 & Part 61 MOS flight activity endorsement standards for the spinning flight activity endorsement	1.2		
TE18-2	FIR-TE18; FIR-TE18.3; FAE-8	Review – Underpinning knowledge required for unit FAE-8 and FIR-TE18	2.0		
Ground Training			7.5 hrs total		
TE18-3	Part 61T & FIR-TE18;	Briefing - Privileges and limitations of the spinning operations training endorsement. Administration procedures and responsibilities including issue of endorsements	1.0		
TE18-4	FIR-TE18.1	Review – Knowledge of competency based training as applied to spinning training	1.0		
TE18-5	FIR-TE18.2; FIR-TE18.4;	Tutorial – Preparing lesson plans and pre-flight briefs for spinning training lessons	1.0		
TE18-6	FIR-TE18.2; FIR-TE18.3;FIR-TE18.4; FAE-8	Spinning operations – Long Brief - Demonstration	1.5		
TE18-7	FIR-TE18.2; FIR-TE18.3;FIR-TE18.4; FAE-8	Spinning operations – Long Brief – Read back	1.5		
TE18-8	FIR-TE18.2; FIR-TE18.4; FAE-8	Plan a Spinning training flight including pre-flight brief – demonstration and discussion	1.5		

LESSON NUMBER	MOS REF	LESSON DESCRIPTION	GROUND HOURS	DUAL HOURS	TOTAL PROG FLIGHT TIME
		Flight Training **TOTALS:**	**5.5**	**4.0**	**+ TEST**
TE18-9	FIR-TE18.6	Conduct aircraft basic, advanced and emergency handling from instructor control seat with focus on spinning	1.0	1.5	1.5
TE18-10	FIR4.3; LL-SO; FIR-TE18.2; FIR-TE18.5	Spinning operations – Pre-flight brief – read back	1.5		
TE18-11	FIR-TE18.2; FIR-TE18.5;FIR-TE18.6; FIR-TE18.7; FIR-TE18.8; FAE-8	Conduct spinning (FAE-8) – pre-flight brief read back air exercise - demonstration and read back	0.5	1.5	3.0
TE18-12	FIR4	FIR Tutorial – Fault analysis and correction	1.0		
TE18-13	FIR4	FIR Tutorial – intervention and recovery techniques	1.0		
TE18-14	FIR-TE18.2; FIR-TE18.5;FIR-TE18.6; FIR-TE18.7; FIR-TE18.8; FAE-8	Conduct spinning (FAE-8) – read back	0.5	1.0	4.0
		Flight Test	**2.0**	**1.0**	**5.0**

MORE IF TAILWHEEL

OVERALL TOTALS **18.2** **5.0**

Sling operations, winch and rappelling operations or spinning or aerobatics

- Long briefing: an applicable operation syllabus sequence.
- Aircraft: equipped and approved to undertake the applicable operation.
- Flight conditions: by day under the VFR.

All applicants should demonstrate a thorough understanding of the underpinning knowledge as listed in schedule 2 of the Part 61 MOS as relevant to the training endorsement being tested.

The requirement for a thorough understanding of underpinning knowledge was removed from the Flight Examiner Handbook. So, the standard of knowledge required is only basic!

Instructor training must be done at an approved flight school which has an approved syllabus and authorised instructors.

Types used for ab initio training such as these are quite suitable for instructor spin training.

Can the requirement to “establish an upright spin” be met in types like the Airtourer T-6 and Cessna 172? They won’t do a fully developed spin.

What School?
What Type?

Specialised types are capable of going far beyond the requirements with other spin modes: inverted, flat, accelerated and transition spins. I prefer to wear a parachute for such operations (a subject in itself).

Instructor spin training in a tailwheel aeroplane requires competency in landings for the test.

I am wary of uncertified types. Tribal knowledge of the Yak 52 is appropriate. RV recommends that spins not be performed and warns of adverse effects of builder modifications. W&B is often an issue.

Pre-Flight Brief

- CASA template
- Spin recovery method
- Demo spin – incipient & patter
- Practice:
  - Focus on correct technique first
  - Then ensure fully developed
- Number of turns?
- Recovery from unintentional spin

The Cone of Learning

Advanced Spinning

- **CASA MOS doesn't require a spin instructor to know any more than a pilot** with a spin endorsement with knowledge of **one airplane type only**.
- The CASA standard is very low!
- **My opinion is that instructors should know about:**
  - **different types and their different recovery methods**
  - **the aggravated spin modes**

Easy Access Rules for Flight Crew Licensing (Part-FCL)

SUBPART J – INSTRUCTORS

SECTION 1 – Common requirements

(4) demonstrate their ability to recover from all spin types, not only from spins entered intentionally, but from spins of unannounced direction of autorotation, and from all potential spin variations, including:

(i) normal (non-aggravated) spins;

(ii) flat spins;

(iii) accelerated spins; and

(iv) transition spins (incorrect recovery resulting in reversal of rotation).

Video - Accelerated Spin

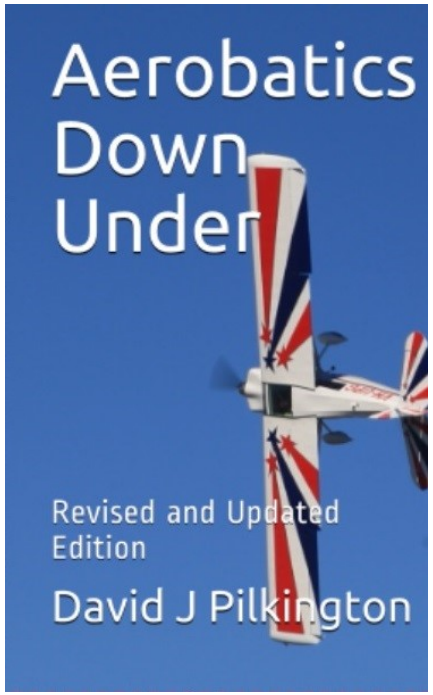
Recovery from an accelerated spin will take longer or may not even be possible. Return to the normal spin mode and then apply normal recovery controls.

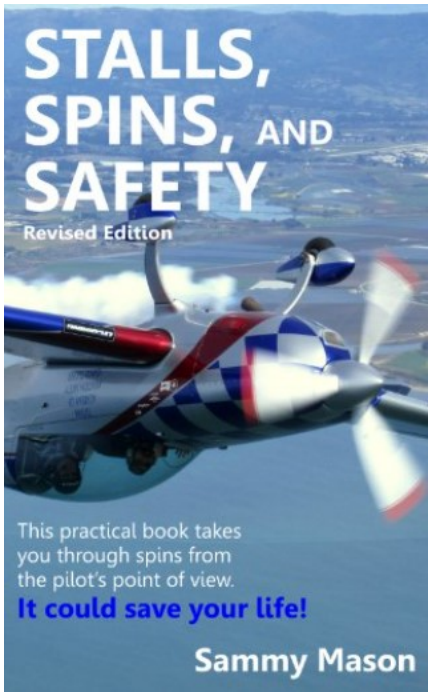
https://youtu.be/jVE_NVEg3ws

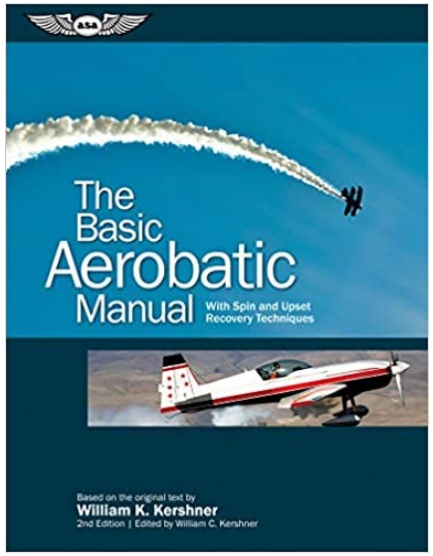
Transition Spin and PARES

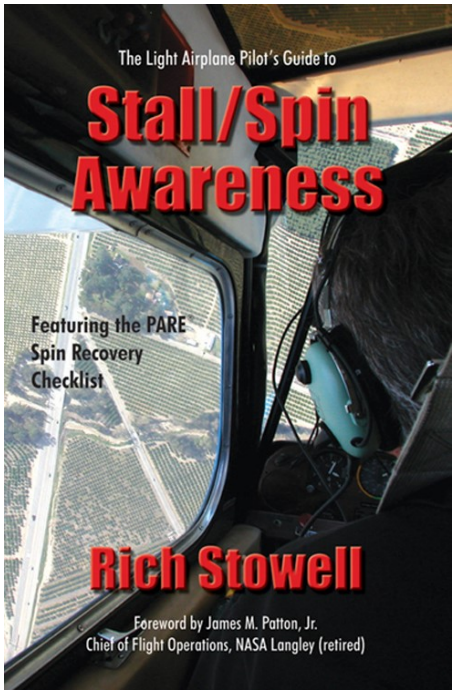
- The Decathlon (and others) can neatly transition from a fully developed upright spin to an inverted spin by applying full forward stick and then full opposite rudder
- The spin slows down, appears to stop and quickly transitions to inverted
- The direction of yaw has reversed however the direction of roll remains the same which can be disorientating
- **Per Rich Stowell in his video: to avoid the accelerated spin and transition spin modes apply full opposite rudder first followed by the elevator!**
- **That is the reason for the standard spin recovery PARE.**
- From the FAR 23 Flight Test Guide: “Recoveries should consist of throttle reduced to idle, ailerons neutralized, full opposite rudder, followed by forward elevator control as required to get the wing out of stall and recover to level flight. For acrobatic category spins, the manufacturer may establish additional recovery procedures, provided they show compliance for those procedures with this section.”
- I use **PARES** to emphasise that both **Rudder** and **Elevator** are generally required before **rotation Stops.**

- See the excellent references at https://www.richstowell.com/









TEXTBOOKS …… QUESTIONS?